Text Part Number: 78-3225-11

Network Processing Engine Replacement Instructions

Product Numbers: NPE-100=, NPE-150=, NPE-175=, NPE-200=, NPE-225=, NPE-300=, CISCO7202=, CISCO7204=, CISCO7206=, CISCO7204VXR=, CISCO7206VXR=, CHAS-UBR7246=, CHAS-UBR7223=, RS7206S=, RS7206VXR-SK=

Introduction

This document explains how to remove and replace the network processing engine (NPE), which can be used in the following platforms:

- Cisco 7200 series routers—which consist of the 2-slot Cisco 7202, the 4-slot Cisco 7204 and Cisco 7204VXR, and the 6-slot Cisco 7206 and Cisco 7206VXR
- Cisco uBR7200 series universal broadband routers—which consist of the 3-slot Cisco uBR7223 (1 port adapter slot and 2 cable modem card slots) and the 6-slot Cisco uBR7246 (2 port adapter slots and 4 cable modem card slots)

This document includes instructions for powering down a router, removing an installed network processing engine, and installing a new network processing engine in the router. This document also includes steps for verifying that the installed network processing engine initializes the system after you power up the router.

Note The Cisco 7206VXR and Cisco 7206 can be used as router shelves in a Cisco AS5800 Universal Access Server. References to the Cisco 7200 VXR and the Cisco 7200 series routers in this document include the Cisco 7206VXR and Cisco 7206 as router shelves in a Cisco AS5800 Universal Access Server, unless indicated otherwise.

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- Removing and Replacing an AC-Input or DC-Input Power Supply, page 35
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If You Need More Information

Your router and the Cisco IOS software running on it contain extensive features and functionality, which are documented in the following resources:

- Cisco Documentation CD-ROM package

  Cisco documentation and additional literature are available in a CD-ROM package, which ships with your product. The Documentation CD-ROM, a member of the Cisco Connection Family, is updated monthly; therefore, it might be more up to date than printed documentation. To order additional copies of the Documentation CD-ROM, contact your local sales representative or call customer service. The CD-ROM package is available as a single package or as an annual subscription.

  If you are reading Cisco product documentation on the World Wide Web, you can submit comments electronically. Click **Feedback** on the toolbar and select **Documentation**. After you complete the form, click **Submit** to send it to Cisco. We appreciate your comments.

- For Cisco IOS software configuration information and support, refer to the modular configuration and modular command reference publications in the Cisco IOS software configuration documentation set that corresponds to the software release installed on your Cisco hardware.

- For hardware installation and maintenance information on the Cisco 7200 series routers, refer to the following publications that shipped with your router:

  — *Cisco 7200 VXR Installation and Configuration Guide*

  — *Cisco 7206 Installation and Configuration Guide*

  — *Cisco 7204 Installation and Configuration Guide*

  — *Cisco 7202 Installation and Configuration Guide*

- For hardware installation and maintenance information and software configuration information on the Cisco AS5800 Universal Access Server, refer to the following publications:

  — *Cisco AS5800 Universal Access Server Hardware Installation and Configuration Guide*

  — *Cisco AS5800 Universal Access Server Software Installation and Configuration Guide*

- For hardware installation and maintenance information on the Cisco uBR7200 series routers, refer to the *Cisco uBR72xx Universal Broadband Router Installation and Configuration Guide* that shipped with your router.

- For international agency compliance, safety, and statutory information for wide-area network (WAN) interfaces for the Cisco 7200 series routers, the Cisco AS5800 Universal Access Server, and the Cisco uBR7200 series routers, refer to the following publications:
  - *Regulatory Compliance and Safety Information for the Cisco 7200 Series Routers*
  - *Cisco AS5800 Universal Access Server Regulatory Compliance and Safety Information*
  - *Regulatory Compliance and Safety Information for the Cisco uBR72xx Universal Broadband Router.*
- For general information about documentation, see the "Cisco Connection Online" section on page 38, or call customer service at 800 553-6387 or 408 526-7208. Customer service hours are 5:00 a.m. to 6:00 p.m. Pacific time, Monday through Friday (excluding Cisco-observed holidays). You can also send e-mail to cs-rep@cisco.com.

Note You can access Cisco IOS software configuration and hardware installation and maintenance documentation on the World Wide Web at http://www.cisco.com, http://www-china.cisco.com, or http://www-europe.cisco.com.

Network Processing Engine Description

The network processing engine maintains and executes the system management functions for the Cisco 7200 series routers and Cisco uBR7200 series routers. The network processing engine also shares the system memory and environmental monitoring functions with the I/O controller.

The network processing engine is available in five versions: NPE-150, NPE-175, NPE-200, NPE-225, and NPE-300. The network processing engines have the same functionality; however, the performance differs because of the microprocessor type and the type of memory for packet data (SRAM and DRAM, or SDRAM) that each network processing engine provides.

The NPE-175 and NPE-225 consist of two modular boards: the processor engine board and the network controller board. SRAM is not included in the NPE-175 or NPE-225.

Note The NPE-100 is no longer an orderable product as of May 1999.

Note The Cisco 7200 VXR routers support all versions of the NPE.

The Cisco 7200 routers support the NPE-100, NPE-150, NPE-175, NPE-200, and NPE-225.

The Cisco 7206 as a router shelf in a Cisco AS5800 Universal Access Server only supports the NPE-200. The Cisco 7206VXR as a router shelf supports the NPE-300.

The Cisco uBR7200 series supports only the NPE-150 and the NPE-200.

Note The NPE-300 is compatible with the Cisco 7200 VXR routers only. The NPE-300 is keyed to prevent insertion in the Cisco 7200 series routers (7202, 7204, and 7206).

The network processing engines consist of the following components:

- Reduced instruction set computing (RISC) microprocessor
  - The NPE-100 and NPE-150 have an R4700 microprocessor that operates at an internal clock speed of 150 MHz.
  - The NPE-175 has an RM5270 microprocessor that operates at an internal clock speed of 200 MHz.
  - The NPE-200 has an R5000 microprocessor that operates at an internal clock speed of 200 MHz.
  - The NPE-225 has an RM5271 microprocessor that operates at an internal clock speed of 262 MHz.
  - The NPE-300 uses an RM7000 microprocessor that operates at an internal clock speed of 262 MHz.
- System controller
  - The NPE-100, NPE-150, and NPE-200 have a system controller that uses direct memory access (DMA) to transfer data between DRAM and packet SRAM on the network processing engine.
  - The NPE-175 and NPE-225 have one system controller that provides processor access to the two midplane and single I/O controller PCI buses. The system controller also allows port adapters on either of the two midplane PCI buses access to SDRAM.
  - The NPE-300 has two system controllers that provide processor access to the two midplane and single I/O controller PCI buses. The system controllers also allow port adapters on either of the two midplane PCI buses access to SDRAM.
- Upgradable memory modules
  - The NPE-100, NPE-150, and NPE-200 use DRAM for storing routing tables, network accounting applications, packets of information in preparation for process switching, and packet buffering for SRAM overflow (except in the NPE-100, which contains no packet SRAM). The standard configuration is 32 MB, with up to 128 MB available through single in-line memory module (SIMM) upgrades.
  - The NPE-175 and NPE-225 use SDRAM for providing code, data, and packet storage.
  - The NPE-300 uses SDRAM for storing all packets received or sent from network interfaces. The SDRAM also stores routing tables and network accounting applications. Two independent SDRAM memory arrays in the system allow concurrent access by port adapters and the processor.
- Packet SRAM for storing packets of information in preparation for fast switching
  - The NPE-100 does not have packet SRAM.
  - The NPE-150 has 1 MB of SRAM.
  - The NPE-175 does not have packet SRAM.
  - The NPE-200 has 4 MB of SRAM.
  - The NPE-225 does not have packet SRAM.
  - The NPE-300 does not have packet SRAM.

- Cache memory
  - The NPE-100, NPE-150, and NPE-200 have unified cache SRAM that functions as the secondary cache for the microprocessor. (The primary cache is within the microprocessor.)
  - The NPE-175 and NPE-225 have two levels of cache: a primary that is internal to the processor and a secondary, 2-MB external cache that provides additional high-speed storage for data and instructions.
  - The NPE-300 has three levels of cache: a primary and a secondary cache that are internal to the microprocessor, and a tertiary, 2-MB external cache that provides additional high-speed storage for data and instructions.
- Two environmental sensors for monitoring the cooling air as it leaves the chassis
- Boot ROM for storing sufficient code for booting the Cisco IOS software; the NPE-175, NPE-200, NPE-225, and NPE-300 have boot ROM

The network processing engines perform the following system management functions:

- Sending and receiving routing protocol updates
- Managing tables, caches, and buffers
- Monitoring interface and environmental status
- Providing Simple Network Management Protocol (SNMP) management through the console and Telnet interface
- Accounting for and switching of data traffic
- Booting and reloading images
- Managing port adapters (recognition and initialization during online insertion and removal)

Figure 1 shows the NPE-100, Figure 2 shows the NPE-150, Figure 3 shows the NPE-175, Figure 4 shows the NPE-200, Figure 5 shows the NPE-225, and Figure 6 shows the NPE-300.

Figure 1 NPE-100

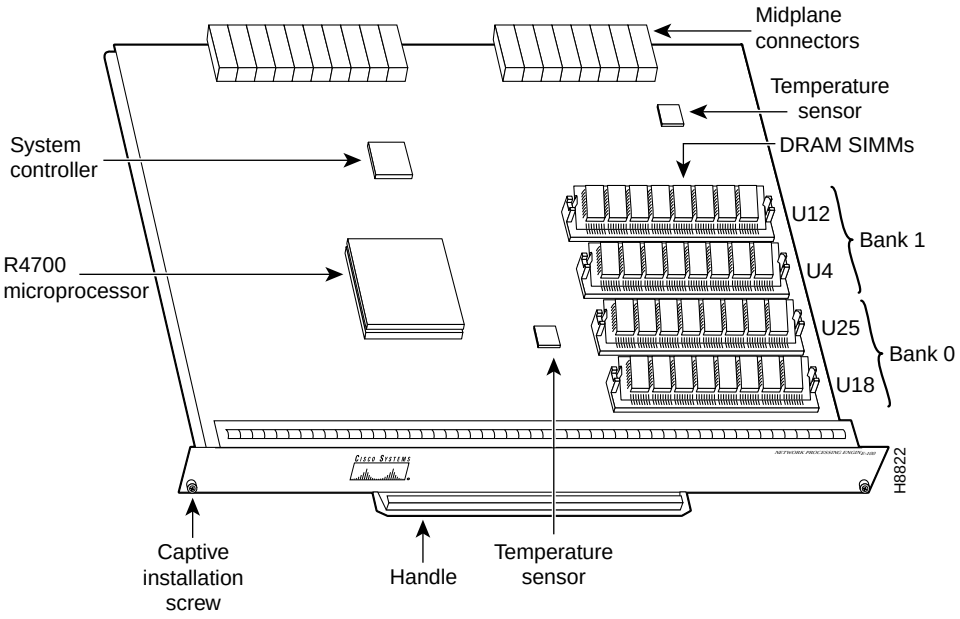


Figure 2 NPE-150

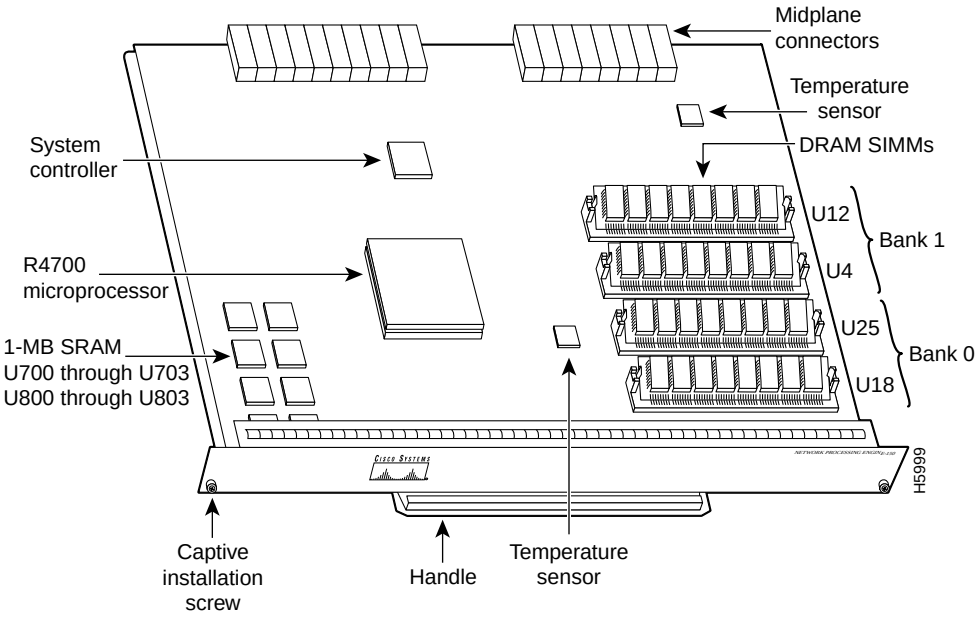


Figure 3 NPE-175

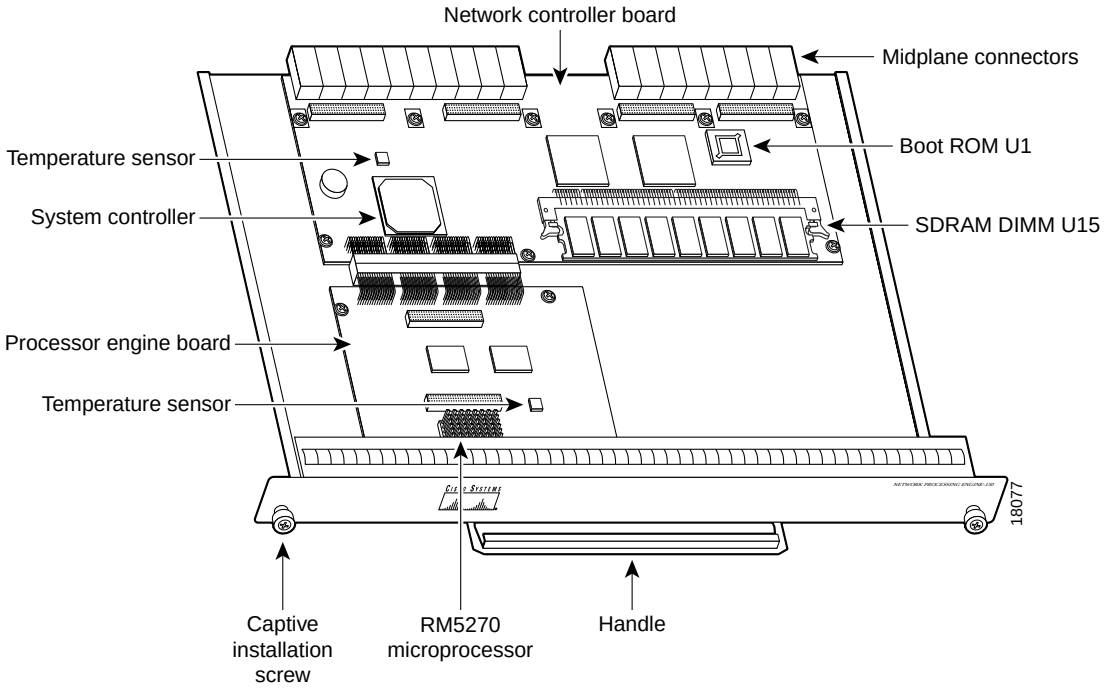


Figure 4 NPE-200

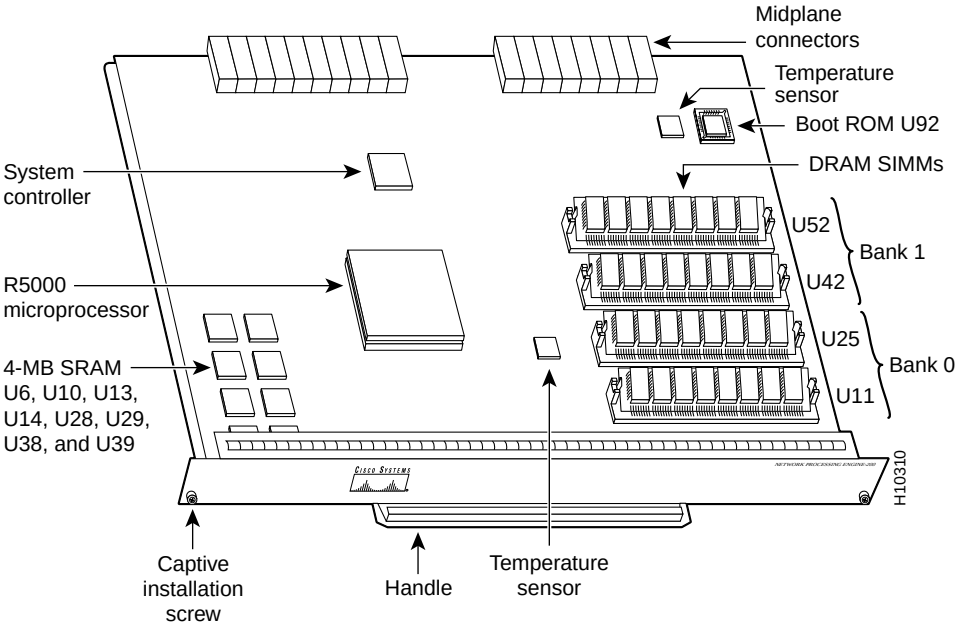


Figure 5 NPE-225

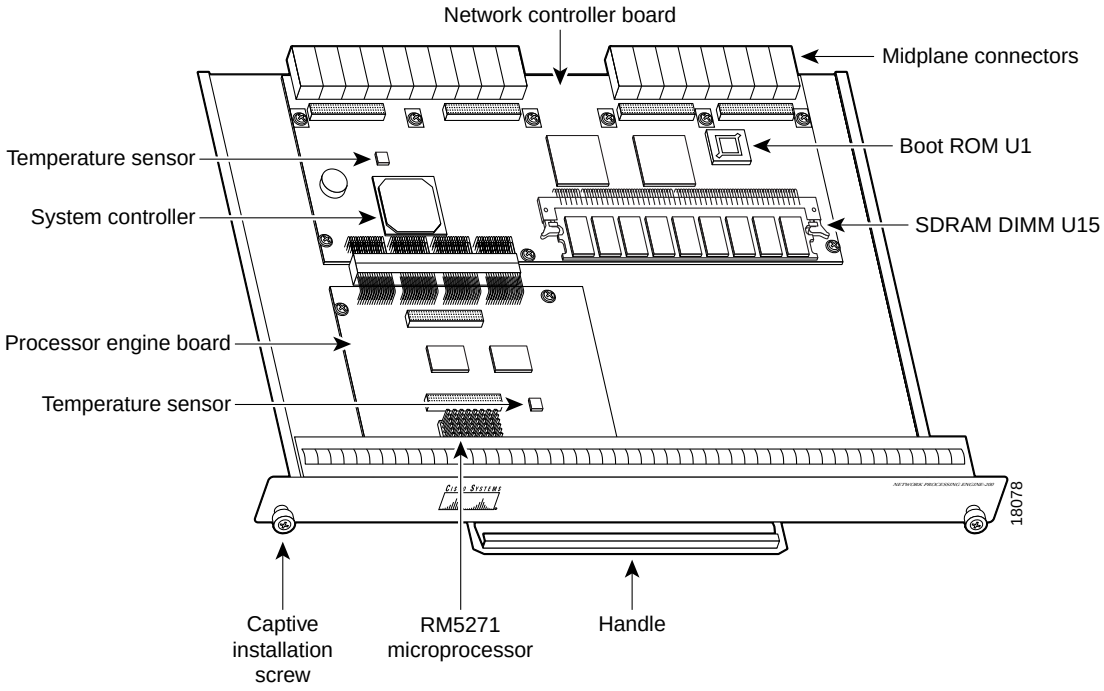


Figure 6 NPE-300

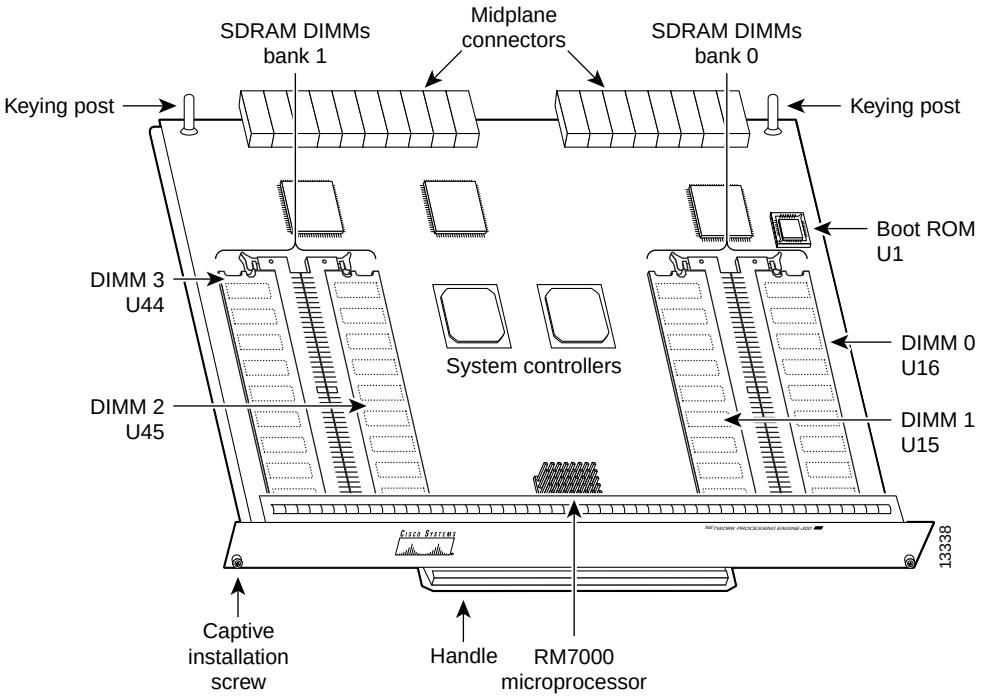


Table 1 lists the NPE-100, NPE-150, and NPE-200 network processing engine memory components.

Table 1 Network Processing Engine Memory Specifications (Cisco 7200 Routers and Cisco uBR7200 Series

Memory Type	Size	Quantity	Description	Location
DRAM	32 to 128 MB	2 to 4	16- or 32-MB SIMMs (based on maximum DRAM required)	Bank 0: U18 and U25 or U11 and U25[1] Bank 1: U4 and U12 or U42 and U52[2]
SRAM				
NPE-150	1 MB	8	8 chips, each being 128K x 9 bits wide	U700 through U703 U800 through U803
NPE-200	4 MB	8	8 chips, each being 512K x 8 bits wide	U6, U10, U13, U14, U28, U29, U38, and U39
Boot ROM[3]				
NPE-200	256 KB	1	EPROM for the ROM monitor program	Socket U92
Unified cache	512 KB	4	Secondary cache for the R4700	NPE-100 and NPE-150 U2, U10, U14, and U26
			Secondary cache for the R5000	NPE-200 U16, U9, U109, and U107

1 The sockets for bank 0 on the NPE-100 and the NPE-150 are numbered U18 and U25. The same sockets on the NPE-200 are numbered U11 and U25.

2 The sockets for bank 1 on the NPE-100 and the NPE-150 are numbered U4 and U12. The same sockets on the NPE-200 are numbered U42 and U52.

3 ROM = read-only memory. The NPE-100 and NPE-150 use the boot ROM present on the I/O controller.

Note To prevent DRAM errors in the NPE-100, NPE-150, or NPE-200, and to ensure that your system initializes correctly at startup, DRAM bank 0 (socket U18 and U25, or U11 and U25) must contain no fewer than two SIMMs of the same type. You may also install two SIMMs of the same type in bank 1 (socket U4 and U12, or U42 and U52); however, bank 0 must always contain the two largest SIMMs.

Table 2 lists the NPE-175 and NPE-225 memory specifications.

Table 2 NPE-175 and NPE-225 Memory Specifications

Memory Type	Size	Quantity	Description	Location
SDRAM	64 or 128 MB	1 configurable bank with 1 SDRAM slot	DIMM	U15
Boot ROM	512 KB		OTP[1] ROM for the ROM monitor program	U1
Primary cache	16 KB (instruction), 16 KB (data)		R527x processor primary internal cache	U4
	32 KB (instruction), 32 KB (data)		R527x processor primary internal cache	U4
Unified cache	2 MB	4 chips, each 512K by 8 bits wide	Secondary external cache for the R527x processor	U5, U6, U7, U8[2]

1 OTP = one time programmable.
2 Located on Processor Engine board.

Table 3 lists the NPE-300 memory specifications.

Table 3 NPE-300 Memory Specifications

Memory Type	Size	Quantity	Description	Location
SDRAM	32 to 128 MB	1 configurable[1] bank with 2 SDRAM slots	32-, 64-, or 128-MB DIMMs (based on maximum SDRAM required)	Bank 1: U45 and U44[2]
Boot ROM	512 KB	1	OTP[3] ROM for the ROM monitor program	Socket U1
Primary cache	16 KB (instruction), 16 KB (data)		RM7000 processor primary internal cache	Socket U49
Unified cache	256 KB		Secondary RM7000 processor internal, unified instruction and data cache	Socket U49
Integrated cache	2 MB (fixed)		Tertiary external cache for the RM7000 processor	

1 Bank 0 is used exclusively for packet memory and is not user configurable.
2 Bank 1 contains the Cisco IOS software, processor memory, and packet memory.
3 OTP = one time programmable.

Table 4 lists the NPE-100, NPE-150, and NPE-200 factory-installed DRAM configurations and their product numbers.

Table 4 DRAM SIMM Configurations (Cisco 7200 Routers and Cisco uBR7200 Series)

Total DRAM[1]	DRAM Bank 0	Quantity	DRAM Bank 1	Quantity	Product Number
32 MB	U18 and U25 or U11 and U25	2 16-MB SIMMs	U4 and U12 or U42 and U52	–	MEM-NPE-32MB[2]
64 MB	U18 and U25 or U11 and U25	2 32-MB SIMMS	U4 and U12 or U42 and U52	–	MEM-NPE-64MB[2]
128 MB	U18 and U25 or U11 and U25	2 32-MB SIMMs	U4 and U12 or U42 and U52	2 32-MB SIMMs	MEM-NPE-128MB[2]

1 Refer to the Cisco AS5800 Universal Access Server documentation listed in the "If You Need More Information" section on page 2 for Cisco AS5800 Universal Access Server DRAM options.

2 These products are also available as DRAM upgrades. For example, to upgrade a network processing engine from 32 MB to 64 MB of DRAM, order Product Number MEM-NPE-32MB=.

Table 5 lists the NPE-175 and NPE-225 SDRAM DIMM configurations.

Table 5 NPE-175 and NPE-225 SDRAM DIMM Configurations

Total DRAM	DRAM Bank	Quantity	Product Number
64 MB	U15	1 64-MB DIMM	MEM-NPE-64MB
128 MB	U15	1 128-MB DIMM	MEM-SD-NPE-128MB

The NPE-300 contains two banks of SDRAM. Both SDRAM banks are used for all packet memory requirements; however, bank 0 is used exclusively for packet memory and is set at a fixed configuration in the factory.

Bank 1 contains two user-configurable SDRAM slots, DIMM slot 2 and DIMM slot 3 (see Figure 6). Both slots in bank 1 can be populated by DIMMs of different sizes; however, the size of the DIMM in slot 2 must be greater than or equal to the size of the DIMM in slot 3, and the size of the DIMM in slot 3 can be zero.

Table 6 lists the NPE-300 factory-installed SDRAM configurations and their product numbers.

Table 6 NPE-300 SDRAM DIMM Configurations (Cisco 7200 VXR)

Total SDRAM[1]	SDRAM Bank 0[2]	Quantity	Product Number[3]
32 MB	U45 (DIMM slot 2 only)	1 32-MB DIMM	MEM-SD-NPE-32MB
64 MB	U45 and U44 or U45	2 32-MB DIMMs or 1 64-MB DIMM	MEM-SD-NPE-32MB MEM-SD-NPE-64MB
128 MB	U45 and U44 or U45	2 64-MB DIMMs or 1 128-MB DIMM	MEM-SD-NPE-64MB MEM-SD-NPE-128MB
256 MB	U45 and U44	2 128-MB DIMMs	MEM-SD-NPE-128MB

1 Refer to the Cisco AS5800 Universal Access Server documentation listed in the "If You Need More Information" section on page 2 for Cisco AS5800 Universal Access Server SDRAM options.

2 There are two user-upgradable SDRAM slots in bank 1. (Bank 0 is used exclusively for packet memory and is set at a fixed configuration in the factory.)

3 These products are also available as SDRAM upgrades. To order an upgrade, add an equal sign (=) after the product number, for example, MEM-SD-NPE-128MB=.

Use the **show version** command to identify the Network Processing Engine installed in your Cisco 7200 series or Cisco uBR7200 series router. The following example shows an installed NPE-225 in a Cisco 7206VXR router:

```
router(boot)# show version
Cisco Internetwork Operating System Software
IOS (tm) 7200 Software (C7200-BOOT-M), Experimental Version 12.0(19990124:222541)
[rramacha-manna-nightly 115]
Copyright (c) 1986-1999 by cisco Systems, Inc.
Compiled Mon 15-Feb-99 21:50 by rramacha
Image text-base:0x600088F8, data-base:0x6064C000

  (display text omitted)

cisco 7206VXR (NPE225) processor with 57344K/8192K bytes of memory.
R527x CPU at 262Mhz, Implementation 40, Rev 10.0, 2048KB L2 Cache
6 slot VXR midplane, Version 2.0

  (display text omitted)
```

The following example of the **show version** command identifies an NPE-300 installed in a Cisco 7206VXR router:

```
Router# show version
Cisco Internetwork Operating System Software
IOS (tm) 7200 Software (C7200-JS-M), Released Version 12.0(19980705:021501) Copyright
(c) 1986-1998 by cisco Systems, Inc.
Compiled Tue 25-Aug-98 04:01 by xxxxx
Image text-base: 0x600088C4, data-base: 0x60FA6000

  (display text omitted)

cisco 7206VXR (NPE300) processor with 61440K/20480K bytes of memory.
R7000 CPU at 262Mhz, Implementation 39, Rev 1.0, 265KB L2, 2048KB L3 Cache
Six slot VXR midplane, Version 2.255

  (display text omitted)
```

Installation Prerequisites

This section provides a list of parts and tools you need to remove and replace the network processing engine in Cisco 7200 series routers and Cisco uBR7200 series routers. This section also includes safety and ESD-prevention guidelines to help you avoid injury to yourself and damage to the equipment. See the “Cisco Connection Online” section on page 38 for ordering and contact information.

Tools and Parts Required

You need the following parts and tools to remove and replace a network processing engine in Cisco 7200 series or Cisco uBR7200 series routers.

- A network processing engine (NPE-100, NPE-150, NPE-175, NPE-200, NPE-225, or NPE-300)
- Number 2 Phillips screwdriver and a 3/16-inch flat-blade screwdriver
- An 8-mm wrench or nut driver, or adjustable wrench (for connecting a grounding lug to a Cisco uBR7200 series DC-input power supply)
- A 7-mm wrench or nut driver, or adjustable wrench (for connecting the DC-input power lead strain-relief cover to a DC-input power supply)
- Standard wire stripper (for connecting power to an installed DC-input power supply)
- Tape (for securing the switch handle of a DC circuit breaker in the OFF position)
- Your own ESD-prevention equipment or the disposable grounding wrist strap included with all field-replaceable units (FRUs)
- An antistatic mat or surface, or static-shielding bag

If your router is mounted in a 4-post or telco rack, make sure you have at least one other person available to assist you with removing the chassis from the rack.

Software and Hardware Requirements

When installing an NPE-100 or NPE-150 in a Cisco 7200 series router, you must replace the existing boot ROM on the I/O controller (see Figure 7) with the updated boot ROM that shipped with the NPE-100 or NPE-150.

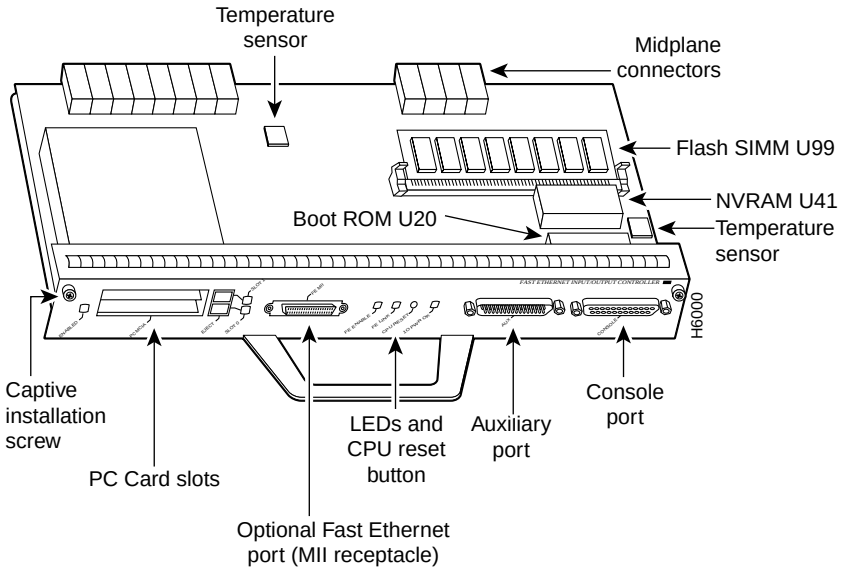
Note There is a boot ROM on the NPE-175, NPE-200, NPE-225, and on the NPE-300; therefore, you do not have to replace the boot ROM on the I/O controller when installing a new NPE-175, NPE-200, NPE-225, or NPE-300. When powering up a Cisco 7200 VXR router that has a newly installed NPE-175, NPE-200, NPE-225, or NPE-300, or when powering up a Cisco 7200 router that has a newly installed NPE-200, the system automatically uses the boot instructions contained in the NPE boot ROM and ignores the boot ROM on the I/O controller.

This note does not apply to the Cisco uBR7200 series or the Cisco 7206VXR and Cisco 7206 as router shelves in a Cisco AS5800 Universal Access Server.

When installing an NPE-175, NPE-225, or NPE-300 in a Cisco 7200 VXR router that is using a previously purchased I/O controller, you must replace the existing Flash SIMM on the I/O controller (see Figure 7) with the updated Flash SIMM that shipped with your NPE-300. The updated Flash SIMM contains the new boot image you need to boot your router.

Note Instructions for replacing the boot ROM and upgrading the Flash SIMM on the I/O controller are contained in the *Memory Replacement Instructions* publication, which accompanied your new network processing engine.

Figure 7 Input/Output Controller—Showing Boot ROM and Flash SIMM



Note The Cisco 7200 VXR routers support all versions of the NPE.

The Cisco 7200 routers support the NPE-100, NPE-150, NPE-175 NPE-200, and NPE-225.

The Cisco 7206 as a router shelf in a Cisco AS5800 Universal Access Server supports the NPE-200 only. The Cisco 7206VXR as a router shelf supports the NPE-200 and NPE-300 only.

The Cisco uBR7200 series supports only the NPE-150 and the NPE-200.

Note The NPE-300 is compatible with the Cisco 7200 VXR routers only. The NPE-300 is keyed (see Figure 6) to prevent insertion in the Cisco 7200 routers (7202, 7204, and 7206).

Table 7 lists the recommended minimum Cisco IOS software release to ensure proper operation of the network processing engine in supported router platforms.

Table 7 Network Processing Engine Software and Hardware Requirements

Router Platform[1]	Network Processing Engine					
	NPE-100	NPE-150	NPE-200	NPE-175	NPE-225	NPE-300
Cisco 7200 series						
• Cisco 7204VXR and Cisco 7206VXR	Cisco IOS Release 12.0(2)XE2 or later releases of 12.0 XE Cisco IOS Release 12.0(3)T or later releases of 12.0 T			Cisco IOS Release 12.0(4)XE or later releases of 12.0 XE Cisco IOS Release 12.0(5)T or later releases of 12.0 T		Cisco IOS Release 12.0(2)XE2 or later releases of 12.0 XE Cisco IOS Release 12.0(3)T or later releases of 12.0 T
• Cisco 7204 and Cisco 7206	Cisco IOS Release 11.1(17)CA or later releases of 11.1CA Cisco IOS Release 11.2(12)P or later releases of 11.2P Cisco IOS Release 11.3(2)T or later releases of 11.3 T Cisco IOS Release 11.3(2)AA or later releases of 11.3 AA			Cisco IOS Release 12.0(4)XE or later releases of 12.0 XE Cisco IOS Release 12.0(5)T or later releases of 12.0 T		–
• Cisco 7202	–	Cisco IOS Release 11.1(19)CC1 or later releases of 11.1 CC Cisco IOS Release 11.3(4)AA or later releases of 11.3 AA	–	–	–	–
Cisco AS5800 Universal Access Server						
• Cisco 7206 router shelf[2]	–	–	Cisco IOS Release 11.3(2)AA or later releases of 11.3 AA	–	–	–
• Cisco 7206VXR router shelf	–	–	–	–	–	Cisco IOS Release 12.0(4)XJ or later releases of 12.0 XJ
Cisco uBR7200 series						
• Cisco uBR7246 and Cisco uBR7223	–	Cisco IOS Release 11.3(6)NA or later releases of 11.3 NA		–	–	–

1 The NPE-300 is not supported in the Cisco 7202, the Cisco 7204, or the Cisco 7206 routers.

2 For information about the Cisco 7206 or 7206VXR as router shelves in the Cisco AS5800 Universal Access Server, refer to the Cisco AS5800 Universal Access Server documentation listed in "If You Need More Information" section on page 2.

Safety Guidelines

Following are safety guidelines that you should follow when working with any equipment that connects to electrical power or telephone wiring.

Warning Only trained and qualified personnel should be allowed to install or replace this equipment.

Safety Warnings

Warning This warning symbol means *danger.* You are in a situation that could cause bodily injury. Before you work on any equipment, be aware of the hazards involved with electrical circuitry and be familiar with standard practices for preventing accidents. To see translations of the warnings that appear in this publication, refer to the *Regulatory Compliance and Safety Information* document that accompanied this device.

Waarschuwing Dit waarschuwingssymbool betekent gevaar. U verkeert in een situatie die lichamelijk letsel kan veroorzaken. Voordat u aan enige apparatuur gaat werken, dient u zich bewust te zijn van de bij elektrische schakelingen betrokken risico's en dient u op de hoogte te zijn van standaard maatregelen om ongelukken te voorkomen. Voor vertalingen van de waarschuwingen die in deze publicatie verschijnen, kunt u het document *Regulatory Compliance and Safety Information* (Informatie over naleving van veiligheids- en andere voorschriften) raadplegen dat bij dit toestel is ingesloten.

Varoitus Tämä varoitusmerkki merkitsee vaaraa. Olet tilanteessa, joka voi johtaa ruumiinvammaan. Ennen kuin työskentelet minkään laitteiston parissa, ota selvää sähkökytkentöihin liittyvistä vaaroista ja tavanomaisista onnettomuuksien ehkäisykeinoista. Tässä julkaisussa esiintyvien varoitusten käännökset löydät laitteen mukana olevasta *Regulatory Compliance and Safety Inf*ormation -kirjasesta (määräysten noudattaminen ja tietoa turvallisuudesta).

Attention Ce symbole d'avertissement indique un danger. Vous vous trouvez dans une situation pouvant causer des blessures ou des dommages corporels. Avant de travailler sur un équipement, soyez conscient des dangers posés par les circuits électriques et familiarisez-vous avec les procédures couramment utilisées pour éviter les accidents. Pour prendre connaissance des traductions d’avertissements figurant dans cette publication, consultez le document *Regulatory Compliance and Safety Information* (Conformité aux règlements et consignes de sécurité) qui accompagne cet appareil.

Warnung Dieses Warnsymbol bedeutet Gefahr. Sie befinden sich in einer Situation, die zu einer Körperverletzung führen könnte. Bevor Sie mit der Arbeit an irgendeinem Gerät beginnen, seien Sie sich der mit elektrischen Stromkreisen verbundenen Gefahren und der Standardpraktiken zur Vermeidung von Unfällen bewußt. Übersetzungen der in dieser Veröffentlichung enthaltenen Warnhinweise finden Sie im Dokument *Regulatory Compliance and Safety Information* (Informationen zu behördlichen Vorschriften und Sicherheit), das zusammen mit diesem Gerät geliefert wurde.

Avvertenza Questo simbolo di avvertenza indica un pericolo. La situazione potrebbe causare infortuni alle persone. Prima di lavorare su qualsiasi apparecchiatura, occorre conoscere i pericoli relativi ai circuiti elettrici ed essere al corrente delle pratiche standard per la prevenzione di incidenti. La traduzione delle avvertenze riportate in questa pubblicazione si trova nel documento *Regulatory Compliance and Safety Information* (Conformità alle norme e informazioni sulla sicurezza) che accompagna questo dispositivo.

Advarsel Dette varselsymbolet betyr fare. Du befinner deg i en situasjon som kan føre til personskade. Før du utfører arbeid på utstyr, må du vare oppmerksom på de faremomentene som elektriske kretser innebærer, samt gjøre deg kjent med vanlig praksis når det gjelder å unngå ulykker. Hvis du vil se oversettelser av de advarslene som finnes i denne publikasjonen, kan du se i dokumentet *Regulatory Compliance and Safety Information* (Overholdelse av forskrifter og sikkerhetsinformasjon) som ble levert med denne enheten.

Aviso Este símbolo de aviso indica perigo. Encontra-se numa situação que lhe poderá causar danos físicos. Antes de começar a trabalhar com qualquer equipamento, familiarize-se com os perigos relacionados com circuitos eléctricos, e com quaisquer práticas comuns que possam prevenir possíveis acidentes. Para ver as traduções dos avisos que constam desta publicação, consulte o documento *Regulatory Compliance and Safety Information* (Informação de Segurança e Disposições Reguladoras) que acompanha este dispositivo.

¡Advertencia! Este símbolo de aviso significa peligro. Existe riesgo para su integridad física. Antes de manipular cualquier equipo, considerar los riesgos que entraña la corriente eléctrica y familiarizarse con los procedimientos estándar de prevención de accidentes. Para ver una traducción de las advertencias que aparecen en esta publicación, consultar el documento titulado *Regulatory Compliance and Safety Information* (Información sobre seguridad y conformidad con las disposiciones reglamentarias) que se acompaña con este dispositivo.

Varning! Denna varningssymbol signalerar fara. Du befinner dig i en situation som kan leda till personskada. Innan du utför arbete på någon utrustning måste du vara medveten om farorna med elkretsar och känna till vanligt förfarande för att förebygga skador. Se förklaringar av de varningar som förkommer i denna publikation i dokumentet *Regulatory Compliance and Safety Information* (Efterrättelse av föreskrifter och säkerhetsinformation), vilket medföljer denna anordning.

Electrical Equipment Guidelines

Follow these basic guidelines when working with any electrical equipment:

- Before beginning any procedures requiring access to the chassis interior, locate the emergency power-off switch for the room in which you are working.
- Disconnect all power and external cables before moving a chassis.
- Do not work alone when potentially hazardous conditions exist.
- Never assume that power has been disconnected from a circuit; always check.
- Do not perform any action that creates a potential hazard to people or makes the equipment unsafe.
- Carefully examine your work area for possible hazards such as moist floors, ungrounded power extension cables, and missing safety grounds.

Telephone Wiring Guidelines

Use the following guidelines when working with any equipment that is connected to telephone wiring or to other network cabling:

- Never install telephone wiring during a lightning storm.
- Never install telephone jacks in wet locations unless the jack is specifically designed for wet locations.
- Never touch uninsulated telephone wires or terminals unless the telephone line has been disconnected at the network interface.
- Use caution when installing or modifying telephone lines.

Electrostatic Discharge Prevention

Electrostatic discharge (ESD) damages equipment and impairs electrical circuitry. ESD occurs when printed circuit boards are improperly handled and results in complete or intermittent failures.

The network processing engine, I/O controller, port adapters, and Cisco uBR7200 series cable modem cards consist of printed circuit boards that are fixed in a metal carrier. Electromagnetic interference (EMI) shielding, connectors, and a handle are integral components of the carrier. Handle the network processing engine, I/O controller, port adapters, and Cisco uBR7200 series cable modem cards by their carrier edges and handles; never touch the printed circuit board or connector pins.

Figure 8 shows the location of a printed circuit board in a network processing engine, I/O controller, or Cisco uBR7200 series cable modem card metal carrier. Do not touch the printed circuit board when handling any of the components.

Figure 8 Handling the Network Processing Engine, the I/O Controller, and the Cisco uBR7200 Series Cable Modem Cards—Side View

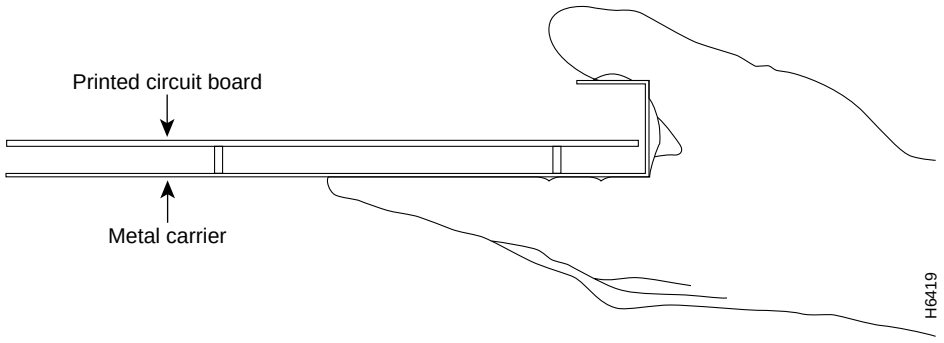
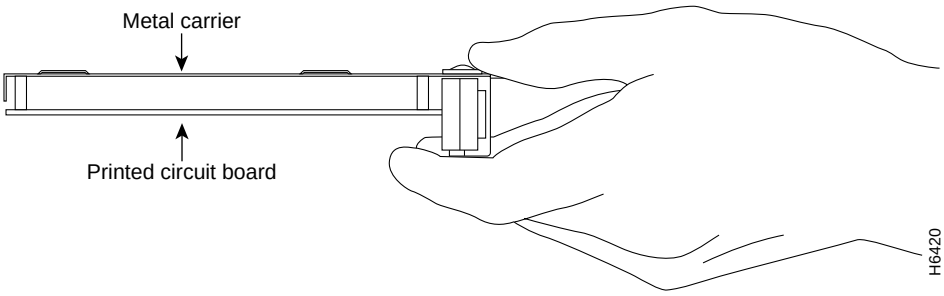


Figure 9 shows the location of a printed circuit board in a port adapter metal carrier. Do not touch the printed circuit board when handling a port adapter.

Figure 9 Handling a Port Adapter—Side View



Although the metal carrier helps to protect the printed circuit boards from ESD, wear a preventive antistatic strap whenever handling the network processing engine, I/O controller, port adapters, or Cisco uBR7200 series cable modem cards. Ensure that the strap makes good skin contact and connect the strap's clip to an unpainted chassis surface to channel unwanted ESD voltages safely to ground.

If no wrist strap is available, ground yourself by touching the metal part of the chassis.

Caution Make sure to tighten the captive installation screws on the network processing engine, Cisco uBR7200 series cable modem cards, and the I/O controller (use a number 2 Phillips or a 3/16-inch flat-blade screwdriver). These screws prevent accidental removal, provide proper grounding for the router, and help to ensure that the network processing engine, Cisco uBR7200 series cable modem cards, and the I/O controller are properly seated in the router midplane.

Following are guidelines for preventing ESD damage:

- Always use an ESD wrist strap or ankle strap when installing or replacing the network processing engine, I/O controller, port adapters, or Cisco uBR7200 series cable modem cards. Ensure that the ESD strap makes contact with your skin.
- Handle the network processing engine, I/O controller, port adapters, or Cisco uBR7200 series cable modem cards by their metal carrier edges and handles only; avoid touching the printed circuit board components or any connector pins.
- When removing the network processing engine, I/O controller, port adapters, or Cisco uBR7200 series cable modem cards, place them on an antistatic surface with the printed circuit board components facing upward, or in a static shielding bag. If you are returning an I/O controller, network processing engine, port adapter, or Cisco uBR7200 series cable modem card to the factory, immediately place it in a static shielding bag.

Caution Periodically check the resistance value of the antistatic strap. The measurement should be within the range of 1 and 10 megohms.

Ensuring Easy Access to the Router

If your Cisco 7200 series router or Cisco uBR7200 series router is installed in a standard 19-inch, 4-post or telco rack, cables from other equipment in the rack might obstruct access to the rear of the router. Also, rack power strips or other permanent fixtures may obstruct access to the router. Review the following guidelines to ensure easy access to the rear of the router when it is installed in a rack. If the router is not installed in a rack, or if you already have clear access to the rear of the router, proceed to the “Removing and Replacing the Network Processing Engine” section on page 19.

Use the following guidelines to ensure easy access to the rear of the router when it is installed in a rack:

- Ensure that you have at least 3 to 4 feet of working space at the rear of the router.
- If cables from other equipment in the rack fall in front of the rear end of the router, carefully gather the cables (using care not to strain them) and use cable ties to anchor them away from the rear of the router.
- If access to the rear of the router is partially blocked by a power strip or some other permanent rack fixture, detach the router from the rack and carefully slide it forward until there is enough clearance to remove the power supply, the network processing engine, and the subchassis from the router. Detailed steps for detaching the router from the rack are contained in the “Removing and Replacing the Network Processing Engine” section on page 19.

Caution Make sure that at least one other person is available to support the front of the router as you slide it out from the rack and, if necessary, to continue to support it while you remove and insert the power supply, network processing engine, or subchassis.

Removing and Replacing the Network Processing Engine

The following sections explain how to remove and replace the network processing engine in the Cisco 7200 series routers or Cisco uBR7200 series routers:

- Powering Down the Router and Disconnecting Input Power, page 19
- Removing the Network Processing Engine, page 24
- Replacing the Network Processing Engine, page 27
- Reconnecting Input Power and Powering Up the Router, page 29

Note If you are installing an NPE-100 or NPE-150, make sure that you replace the boot ROM on the I/O controller before attempting to boot your router. Refer to the "Software and Hardware Requirements" section on page 12 for network processing engine installation requirements.

This note does not apply to the Cisco uBR7200 series or to the Cisco AS5800 Universal Access Server router shelf.

Note Make sure that you upgrade the Flash SIMM on any previously purchased I/O controller before attempting to boot a Cisco 7200 VXR router that has a newly installed NPE-300. Instructions for replacing the Flash SIMM are found in the *Memory Replacement Instructions for the Network Processing Engine and Input/Output Controller* document that shipped with your NPE-300.

Note The procedures for removing and replacing a network processing engine are the same for all Cisco 7200 series routers, including the Cisco 7206 and Cisco 7206VXR when used as router shelves in the Cisco AS5800 Universal Access Server. Therefore, the illustrations and procedures in the following sections apply to the Cisco 7200 series routers and the Cisco AS5800 Universal Access Server router shelves unless indicated otherwise.

There are separate illustrations for the network processing engine and the Cisco uBR7200 series routers.

Note The NPE-300 is only compatible with the Cisco 7200 VXR routers; the NPE-300 is keyed to prevent insertion in Cisco 7200 routers (7202, 7204, 7206).

Powering Down the Router and Disconnecting Input Power

Complete the steps in the following sections to power down the router and disconnect input power.

Warning This unit might have more than one power cord. To reduce the risk of electric shock, disconnect the two power cords before servicing.

Powering Down the Router

To power down a Cisco 7200 series router or Cisco uBR7200 series router, complete the following steps:

Note Before powering down the router, use the **copy running-config startup-config** command to save the router's running configuration to nonvolatile memory.

Step 1 Facing the rear of the router, place the power switch on the power supply in the OFF (0) position. Repeat this action if a second power supply is installed in the router.

Step 2 Observe the following items:

- The green OK LED on the power supply turns off.
- The fans stop operating.
- The LEDs on the I/O controller turn off.
- The LEDs on the port adapters turn off.
- On a Cisco uBR7200 series router, the LEDs on the cable modem cards turn off.

This completes the procedure for powering down a Cisco 7200 series router or Cisco uBR7200 series router.

Caution When the power switch on a Cisco uBR7200 series power supply is turned to the OFF (O) position, the power supply enters a reset cycle for 90 seconds. Wait at least 90 seconds before turning the power switch back to the ON (|) position. If you do not wait the full 90 seconds, the power supply does not restart.

Disconnecting AC-Input Power

To disconnect AC-input power to a Cisco 7200 series router or Cisco uBR7200 series router, complete the following steps:

Step 1 Unplug the input power cable from the power source.

Step 2 On a Cisco 7200 series router, push up on the cable-retention clip that secures the input power cable to the router's power supply.

On a Cisco uBR7200 series router, push the cable-retention clip to the left.

Step 3 Unplug the other end of the input power cable from the power supply. (For the Cisco 7200 series routers, see Figure 10. For the Cisco uBR7200 series routers, see Figure 11.)

Figure 10 Disconnecting Power from a Cisco 7200 Series AC-Input Power Supply

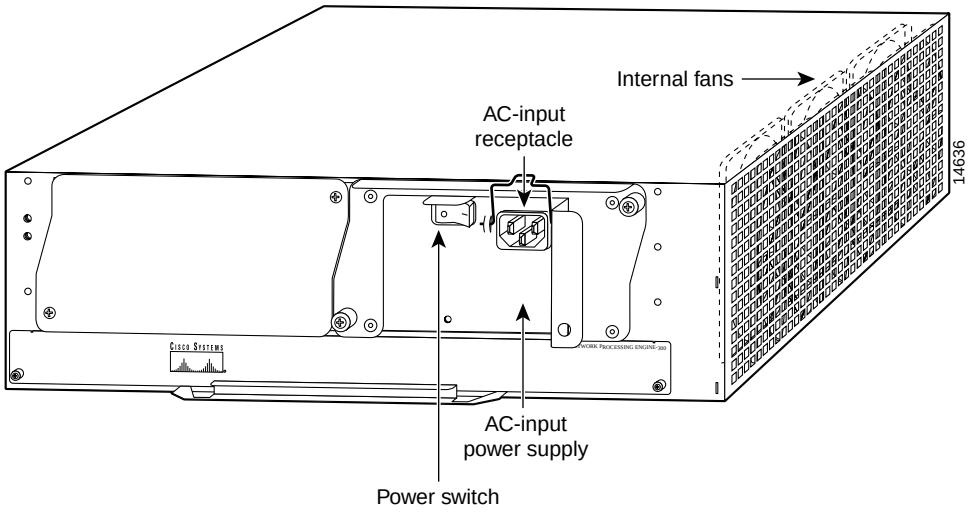
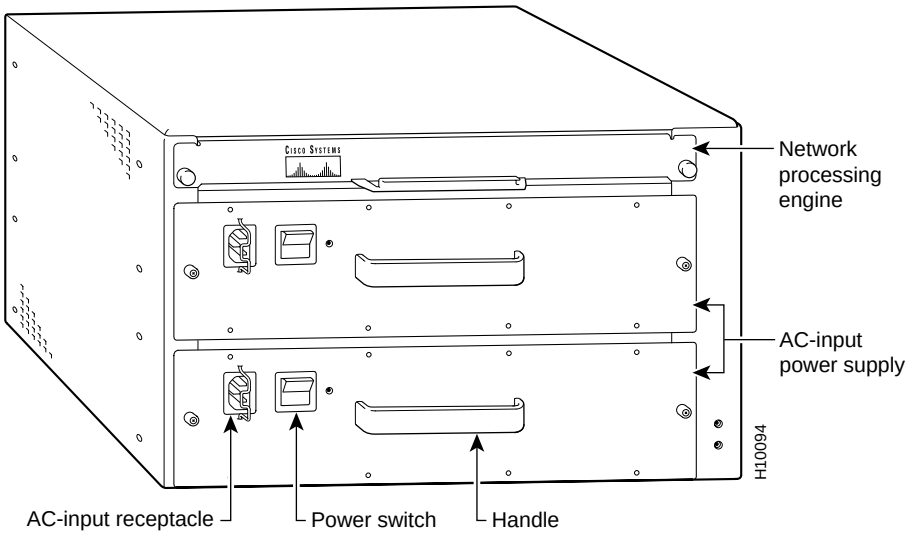


Figure 11 Disconnecting Power from a Cisco uBR7200 Series AC-Input Power Supply (Cisco uBR7246 Shown)



Step 4 Repeat Step 1 through Step 3 if a second power supply is installed.

This completes the procedure for disconnecting AC-input power from a Cisco 7200 series router or Cisco uBR7200 series router.

Disconnecting DC-Input Power

To disconnect DC-input power from a Cisco 7200 series router or Cisco uBR7200 series router, complete the following steps.

Warning Before completing any of the following steps, and to prevent short-circuit or shock hazards, ensure that power is removed from the DC circuit. To ensure that all power is OFF, locate the circuit breaker on the panel board that services the DC circuit, switch the circuit breaker to the OFF position, and tape the switch handle of the circuit breaker in the OFF position.

Warning When you install the unit, the ground connection must always be made first and disconnected last.

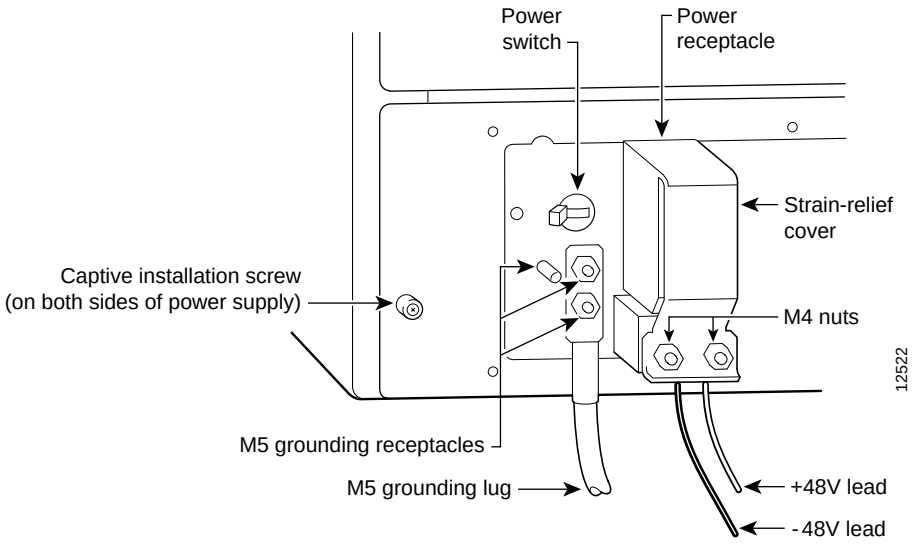
Step 1 Turn OFF the power source and disconnect the –48V and +48V leads from the power source. You can leave the ground cable connected.

Step 2 For a Cisco 7200 series router, remove the cable tie that secures the –48V, +48V, and ground leads to the power supply faceplate. Save the cable tie.

Note The cable tie that accompanied your Cisco 7200 series DC-input power supply can be removed and replaced on the power supply without the use of a tool. If you secured the DC-input power supply leads to the power supply faceplate using a different type of cable tie, use a wire stripper to cut that cable tie from the power supply.

For a Cisco uBR7200 series router, use a 7-mm wrench or nut driver (or adjustable wrench) to loosen and remove the two M4 nuts from the strain-relief cover that secures the –48V and +48V leads to the power supply faceplate. (See Figure 12.)

Figure 12 Removing the Strain-Relief Cover from a Cisco uBR7200 Series DC-Input Power Supply



Step 3 Using a 3/16-inch flat-blade screwdriver, loosen the screw below the +48V lead receptacle and pull the lead from the connector. (For Cisco 7200 series routers, see Figure 13. For Cisco uBR7200 series routers, see Figure 14.)

- For Cisco 7200 series routers, repeat this step for the –48V lead and the ground lead.
- For Cisco uBR7200 series routers, repeat this step for the –48V lead only. Using an 8-mm wrench or nut driver (or adjustable wrench), loosen and remove the two M5 nuts that secure the two-hole-grounding lug to the grounding receptacle, and pull the grounding lug and lead from the receptacle.

Note The color coding of the DC-input power supply leads depends on the color coding of the DC power source at your site. Typically, green or green/yellow is used for ground, black is used for +48V (return), and red or white is used for –48V. Make certain that the lead color coding you choose for the DC-input power supply matches the lead color coding used at the DC power source.

Figure 13 Disconnecting Power from a Cisco 7200 Series DC-Input Power Supply

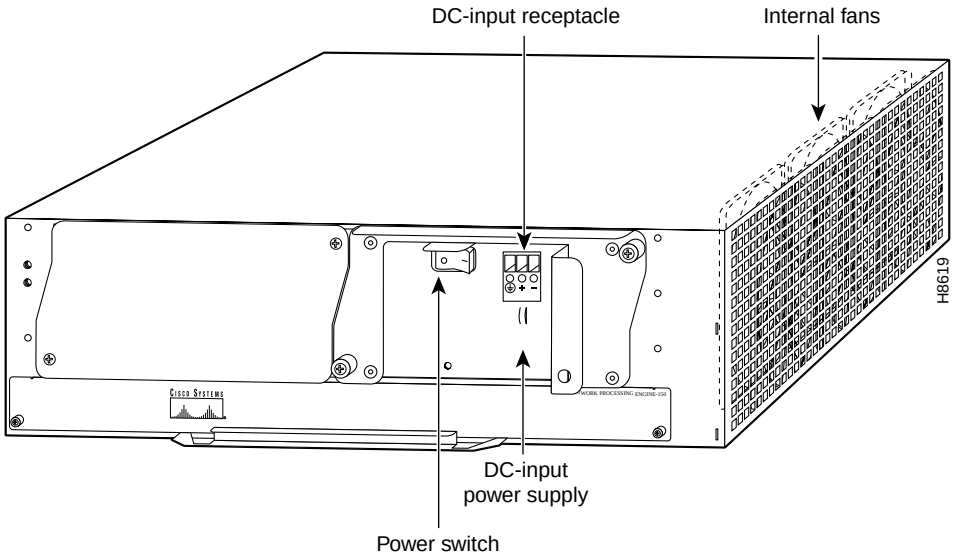
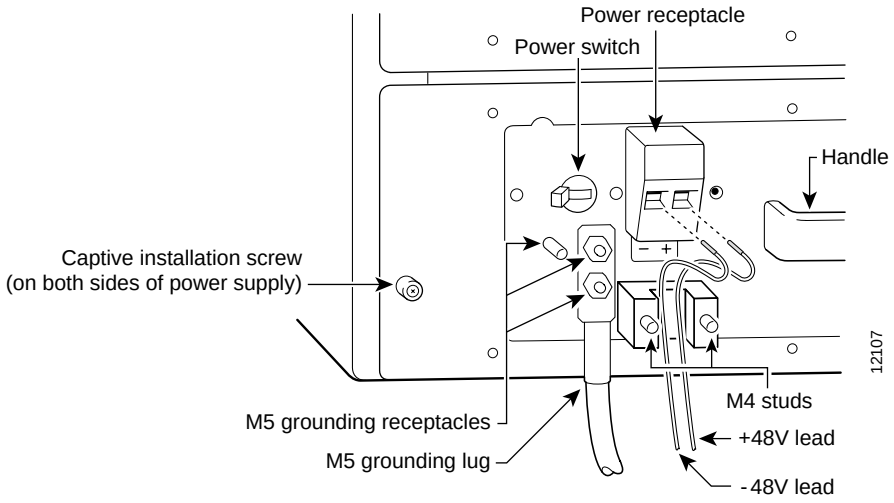


Figure 14 Disconnecting Power from a Cisco uBR7200 Series DC-Input Power Supply



Step 4 Repeat Step 1 through Step 3 if a second power supply is installed.

This completes the procedure for disconnecting DC-input power from a Cisco 7200 series router or Cisco uBR7200 series routers.

Removing the Network Processing Engine

To remove the network processing engine from a Cisco 7200 series router or Cisco uBR7200 series routers, complete the following steps.

Note The weight of installed power supplies in your Cisco 7200 series router might make it difficult to remove the network processing engine. If you have difficulty, consider removing power supplies from the chassis and then removing the network processing engine. See the "Removing and Replacing an AC-Input or DC-Input Power Supply" section on page 35 for information on removing and replacing an installed power supply.

This note does not apply to the Cisco uBR7200 series routers; the network processing engine is installed above the power supplies in the Cisco uBR7200 series routers.

Step 1 Power down the router and disconnect its input power cable. (Refer to the "Powering Down the Router and Disconnecting Input Power" section on page 19.)

Step 2 Attach an ESD-preventive wrist strap between you and an unfinished chassis surface.

Step 3 Using a number 2 Phillips or a 3/16-inch flat-blade screwdriver, loosen the two captive installation screws on the faceplate of the network processing engine. (For a Cisco 7200 series router, see Figure 15. For a Cisco uBR7200 series router, see Figure 16.)

If the router is not installed in a standard 19-inch, 4-post or telco rack, skip to Step 7. If the router is installed in a rack, determine if any permanent rack fixtures, such as a power strip, are obstructing access to the rear of the router. If a rack fixture is obstructing access to the router, proceed with Step 4.

Step 4 Using a 3/16-inch flat-blade screwdriver, loosen the screws that secure the router to the front mounting strips of the rack.

Step 5 Position at least one person in front of the rack to support the front underside of the router.

Step 6 From the rear of the rack, carefully push the front of the router out of the rack until there is enough clearance to remove the network processing engine.

Step 7 Grasp the network processing engine handle and carefully pull the network processing engine from its chassis slot.

Caution Handle the network processing engine by the carrier edges and handle only; never touch the printed circuit board components or connector pins.

Figure 15 Cisco 7200 Series Network Processing Engine Captive Screws and Handle

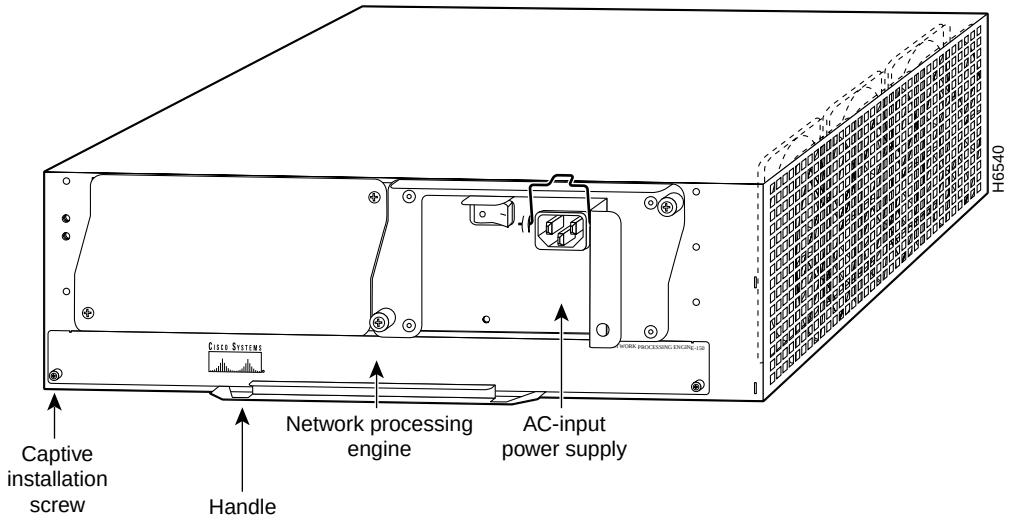
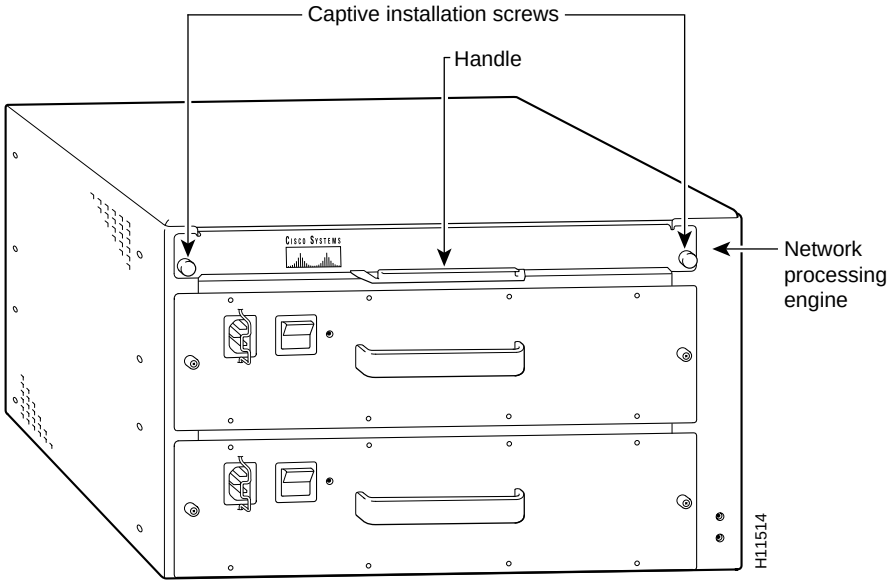


Figure 16 Cisco uBR7200 Series Network Processing Engine Captive Screws and Handle (Cisco uBR7246 Shown)



Step 8 Place the network processing engine on an antistatic surface with its printed circuit board components facing upward, or in a static shielding bag. If you are returning the network processing engine to the factory, immediately place it in a static shielding bag.

This completes the procedure for removing an installed network processing engine.

Replacing the Network Processing Engine

To install a new network processing engine in the router, complete the following steps.

Note If you are installing an NPE-100 or NPE-150, make sure that you replace the boot ROM on the I/O controller before attempting to boot your router. See the "Software and Hardware Requirements" section on page 12 for network processing engine installation requirements.

This note does not apply to Cisco uBR7200 series routers or to the Cisco AS5800 Universal Access Server router shelf.

Step 1 Ensure that the router is powered down and its input power cable is disconnected from the router and the power source. See the "Powering Down the Router and Disconnecting Input Power" section on page 19.

Step 2 Attach an ESD-preventive wrist strap between you and an unfinished chassis surface.

Step 3 Remove the new network processing engine from its static shielding bag.

Step 4 Using both hands, grasp the network processing engine by its metal carrier edges and orient the network processing engine so that its printed circuit board components are upward. (For the Cisco 7200 series routers, see Figure 17. For the Cisco uBR7200 series routers, see Figure 18.)

Caution Handle the network processing engine by the carrier edges and handle only; never touch the printed circuit board components or connector pins.

Step 5 Align the left and right edge of the network processing engine's printed circuit board between the network processing engine slot guides.

Note For the NPE-175 and NPE-225, you need to align the left and right edge of the network processing engine's metal carrier into the guides.

Caution Do not align the network processing engine's metal carrier between the slot guides (for all except the NPE-175 and NPE-225). Doing so damages components on the network processing engine's printed circuit board as you slide the network processing engine into its chassis slot.

Note The NPE-300 is only compatible with the Cisco 7200 VXR routers; the NPE-300 is keyed to prevent insertion in Cisco 7200 routers (7202, 7204, 7206).

Figure 17 Aligning the Network Processing Engine Between the Slot Guides on a Cisco 7200 Series Router

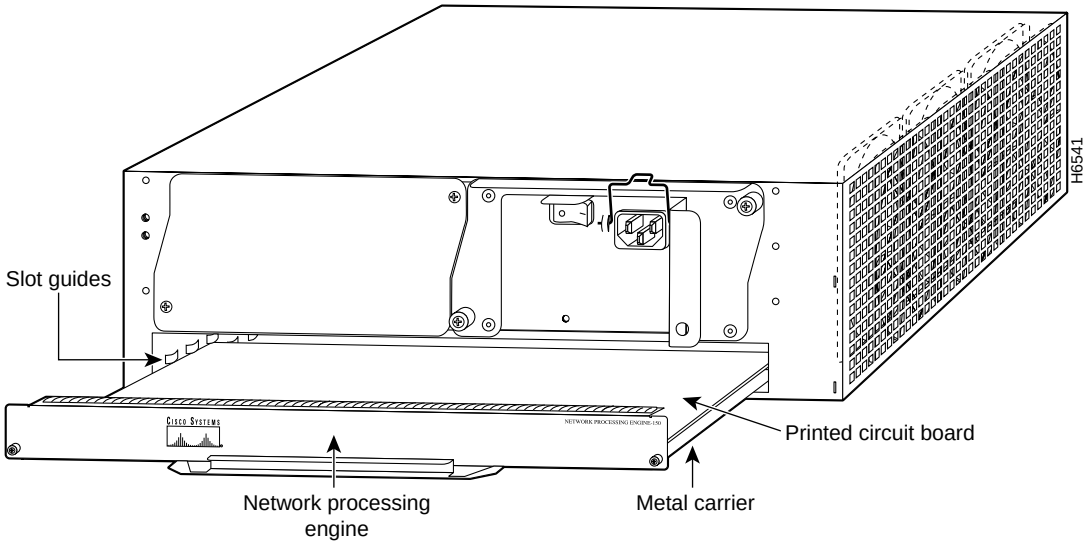
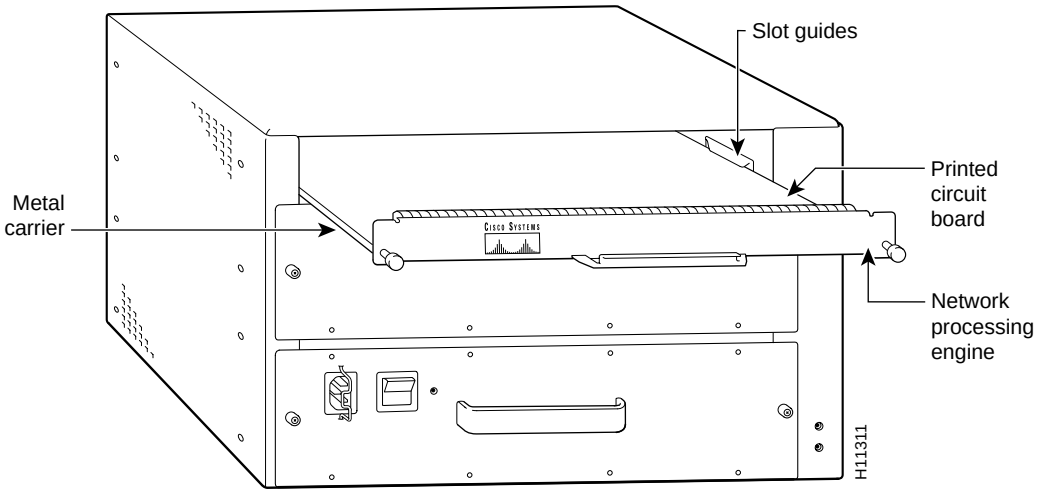


Figure 18 Aligning the Network Processing Engine Between the Slot Guides on a Cisco uBR7200 Series (Cisco uBR7246 Shown)



Step 6 Gently slide the network processing engine all the way into its chassis slot until you feel the connectors seat with the router midplane.

Step 7 Seat the network processing engine in the router midplane by tightening its captive installation screws with a number 2 Phillips or a 3/16-inch flat-blade screwdriver.

Note The network processing engine is not fully seated in the router midplane until you tighten its captive installation screws.

Step 8 If you removed power supplies from the router, replace the power supplies. (See the "Removing and Replacing an AC-Input or DC-Input Power Supply" section on page 35 when replacing a power supply in a Cisco 7200 series router.)

Step 9 If you slid the front of the router out of the rack, slowly guide the router back into the rack.

Step 10 Use a 3/16-inch flat-blade screwdriver to tighten the screws that secure the router to the front mounting strips of the rack.

This completes the procedure for replacing the network processing engine in a Cisco 7200 series router or Cisco uBR7200 series router.

Reconnecting Input Power and Powering Up the Router

The following procedures explain how to reconnect input power to a Cisco 7200 series router or Cisco uBR7200 series router, power up the router, and verify a successful system boot.

Warning Read the installation instructions before you connect the system to its power source.

Note If you are using an NPE-100 or NPE-150, make sure you replace the boot ROM on the I/O controller before attempting to boot your router. See the "Software and Hardware Requirements" section on page 12 for network processing engine installation requirements.

This note does not apply to a Cisco uBR7200 series router or to the Cisco AS5800 Universal Access Server router shelf.

Reconnecting AC-Input Power

To reconnect AC-input power to a Cisco 7200 series router or Cisco uBR7200 series router, complete the following steps:

Step 1 At the rear of the router, check that the power switch on the power supply is in the OFF (O) position.

Step 2 Slide the cable-retention clip up (Cisco 7200 series) or to the left (Cisco uBR7200 series), away from the AC receptacle, and plug in the power cable.

Step 3 Secure the cable in the power supply AC receptacle by sliding the cable-retention clip down (Cisco 7200 series) or to the right (Cisco uBR7200 series), until it snaps around the connector. The cable-retention clip provides strain relief for the AC power cable. (For the Cisco 7200 series routers, see Figure 19. For the Cisco uBR7200 series routers, see Figure 20.)

Figure 19 Connecting AC-Input Power to a Cisco 7200 Series Router

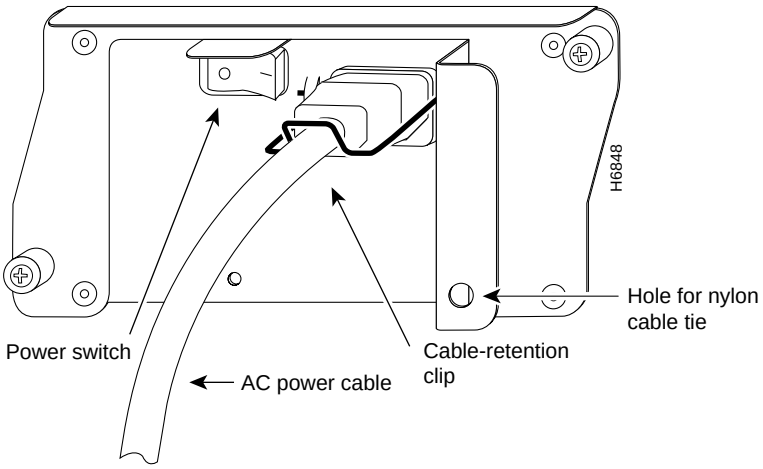
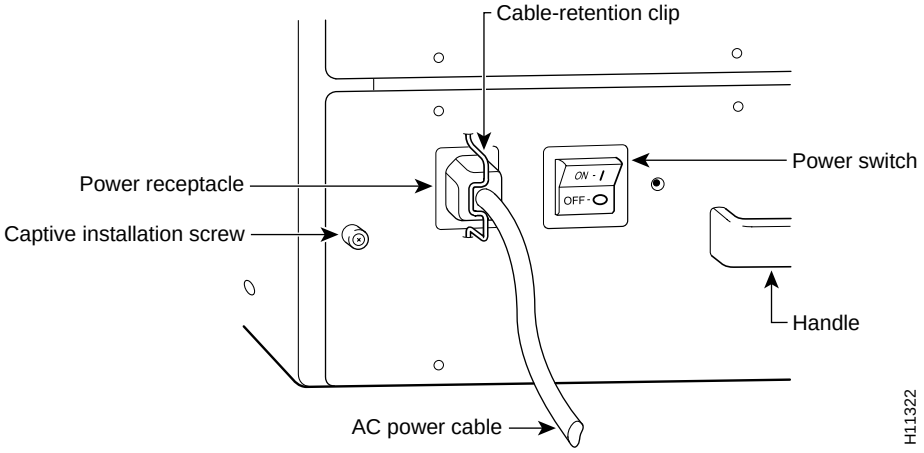


Figure 20 Connecting AC-Input Power to a Cisco uBR7200 Series



Step 4 Plug the AC power supply cable into the AC power source.

Note For the Cisco 7200 series routers, each AC-input power supply operating at 120 VAC requires a minimum of 5A service.

For the Cisco uBR7200 series routers, each AC-input power supply operating at 120 VAC requires a minimum of 7A service.

We recommend powering the Cisco 7200 series routers and Cisco uBR7200 series routers from a 120 VAC, 15A receptacle U.S. (240 VAC, 10A international) at the power source.

Step 5 Repeat Step 1 through Step 4 if a second power supply is installed.

This completes the steps for reconnecting AC-input power to a Cisco 7200 series router or Cisco uBR7200 series router. Proceed to the “Powering Up the Router” section on page 34.

Reconnecting DC-Input Power

To reconnect DC-input power to a Cisco 7200 series router or Cisco uBR7200 series router, complete the following steps.

Note The color coding of the DC-input power supply leads depends on the color coding of the DC power source at your site. Typically, green or green/yellow is used for ground, black is used for +48V (return), and red or white is used for –48V. Make certain that the lead color coding you choose for the DC-input power supply matches the lead color coding used at the DC power source.

Warning Before completing any of the following steps, and to prevent short-circuit or shock hazards, ensure that power is removed from the DC circuit. To ensure that all power is OFF, locate the circuit breaker on the panel board that services the DC circuit, switch the circuit breaker to the OFF position, and tape the switch handle of the circuit breaker in the OFF position.

Warning When installing the unit, the ground connection must always be made first and disconnected last.

Step 1 Ensure that the –48V and +48V leads are disconnected from the power source.

Step 2 At the rear of the router, check that the power switch on the power supply is in the OFF (O) position. (For the Cisco 7200 series routers, see Figure 21. For the Cisco uBR7200 series routers, see Figure 22.)

Figure 21 Connecting DC-Input Power to a Cisco 7200 Series Router

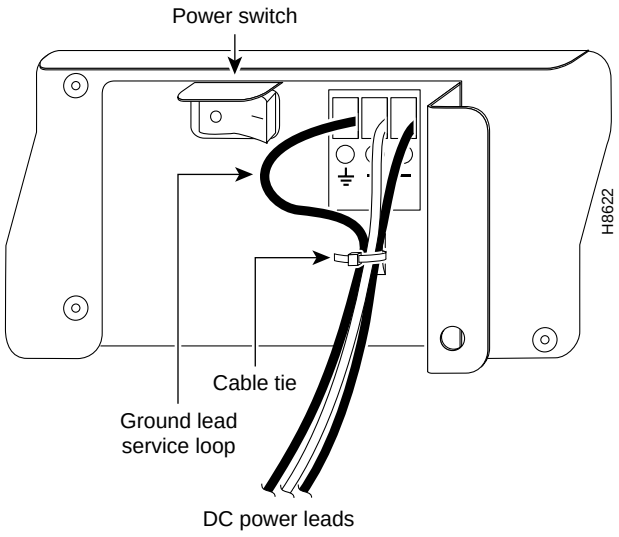
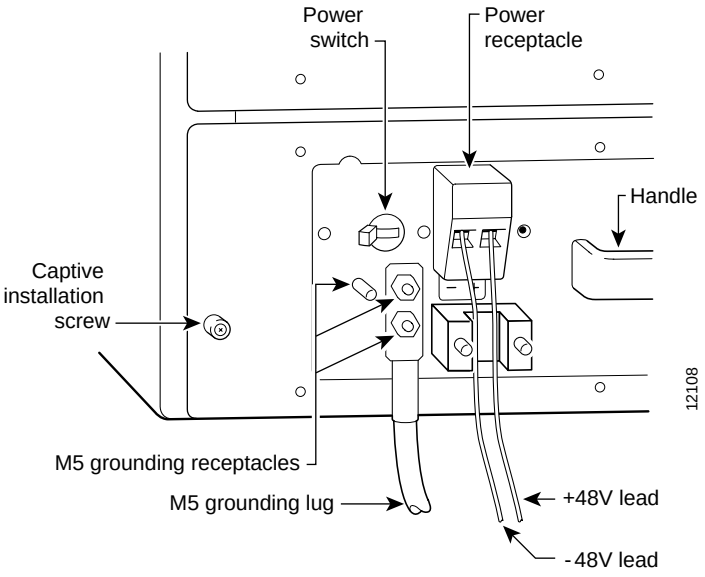
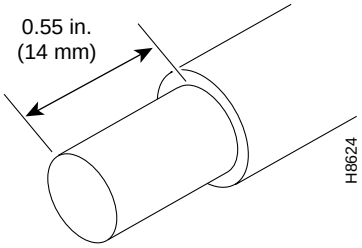


Figure 22 Connecting DC-Input Power to a Cisco uBR7200 Series Universal Broadband Router



Step 3 If necessary, use a wire stripper to strip approximately 0.55 inch (14 mm) from the –48V, +48V, and ground leads. (See Figure 23.)

Figure 23 Stripping the DC-Input Leads



Note The ground lead for the Cisco uBR7200 series DC-input power supply consists of a two-hole grounding lug that connects to an M5 grounding receptacle; you do not need to strip this ground lead.

Step 4 For the Cisco 7200 series routers, insert the stripped end of the ground lead all the way into the ground lead receptacle on the DC-input power supply and tighten the receptacle screw using a 3/16-inch flat-blade screwdriver. (See Figure 21.)

For the Cisco uBR7200 series routers, connect the two-hole grounding lug on the grounding lead to the M5 grounding receptacles with the M5 nuts. Tighten the nuts using an 8-mm wrench or nut driver (or adjustable wrench). (See Figure 22.)

Step 5 Insert the stripped end of the +48V lead all the way into the +48V lead receptacle and tighten the receptacle screw using the same 3/16-inch flat-blade screwdriver. Repeat this step for the –48V lead.

Note Make sure that the entire stripped end of each lead is inserted all the way into its receptacle. If any exposed wire at the stripped end of a lead is visible after inserting the lead into its receptacle, remove the lead from the receptacle, use the wire stripper to cut the stripped end of the lead, and repeat through Step 5.

Step 6 After tightening the receptacle screw or nuts for the ground, +48V, and –48V DC-input leads, secure the leads to the power supply faceplate.

- For the Cisco 7200 series, use the cable tie you saved earlier in this procedure to secure the three leads.

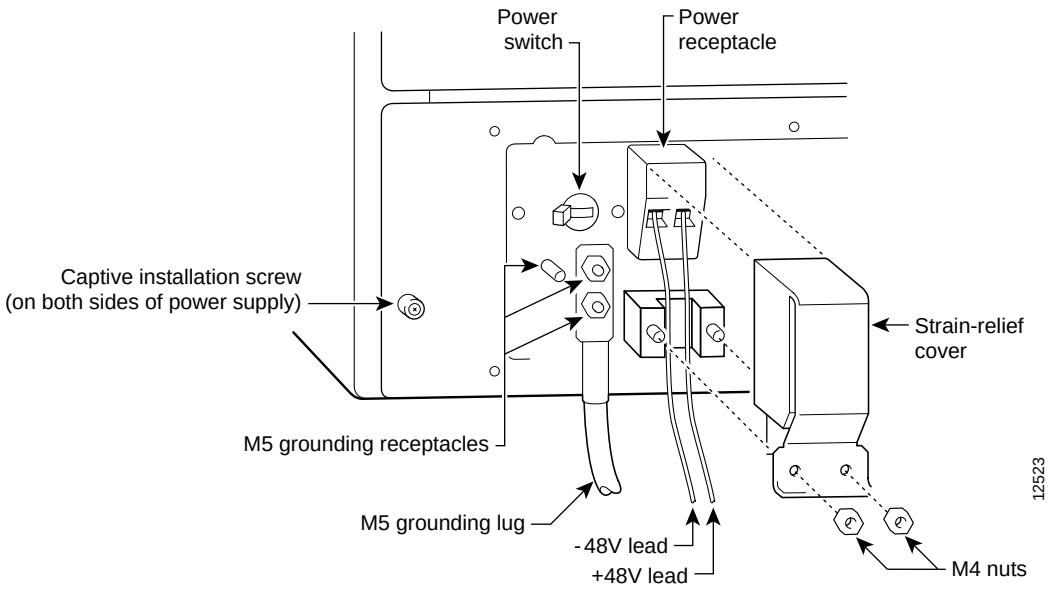
Note For the Cisco 7200 series routers, when securing the ground, +48V, and –48V DC-input leads to the power supply faceplate, leave a small service loop in the ground lead to ensure that it is the last lead to disconnect from the power supply if a great deal of strain is placed on all three leads. (See Figure 21.)

- For the Cisco uBR7200 series routers, run the +48V and –48V leads between the two strain-relief studs on the power supply faceplate. (See Figure 22.)

Note A service loop is not required in the lead attached to the grounding lug on the Cisco uBR7200 series routers because this lead is separate from the +48V and –48V leads and is secured by two M5 nuts to the M5 receptacles.

Step 7 For the Cisco uBR7200 series routers, replace the strain-relief cover over the +48V and –48V leads and secure the cover to the strain-relief studs using the two M4 nuts with the 7-mm wrench or nut driver (or adjustable wrench). (See Figure 24.)

Figure 24 Replacing the Strain-Relief Cover on a Cisco uBR7200 Series DC-Input Power Supply



Step 8 Connect the ground, +48V, and –48V leads to the power source.

Note For the Cisco 7200 series, each DC-input power supply operating at –48 VDC in North America requires a minimum of 13A service. Each DC-input power supply operating at –60 VDC in the European Community requires a minimum of 8A service.

For the Cisco uBR7200 series routers, each DC-input power supply rating is 14A, 700 volt ampere (VA).

This product relies on the building's installation for short-circuit (overcurrent) protection. Ensure that a listed and certified fuse or circuit breaker, 35A minimum 60 VDC, is used on all current-carrying conductors.

Step 9 Repeat Step 1 through Step 8 if a second power supply is installed.

This completes the steps for reconnecting DC-input power to a Cisco 7200 series router or Cisco uBR7200 series router. Proceed to the "Powering Up the Router" section on page 34.

Powering Up the Router

To power up a Cisco 7200 series router or Cisco uBR7200 series router that has an installed power supply, complete the following steps:

Step 1 Check for the following:

- Each port adapter is inserted in its slot, and its respective port adapter lever is in the locked position.
- The network processing engine and the I/O controller are inserted in their respective slots, and the captive installation screws are tightened.
- All network interface cables are connected to the port adapters.
- Each cable modem card is inserted in its slot, and its respective captive installation screws are tightened (Cisco uBR7200 series only).
- A Flash memory card or Flash Disk is installed in one of the PC Card slots.

Note The Flash Disk can be installed in either slot 0 or slot 1.

- Each AC-input power cable is connected and secured with the cable-retention clip (AC-input power supplies only).
- For a Cisco 7200 series router, each DC lead is connected and secured to the power supply faceplate with a cable tie; for a Cisco uBR7200 series router, each DC lead is connected with M5 nuts for the grounding receptacle and the strain-relief cover over the +48V and –48V leads (DC-input power supplies only).
- Each DC lead is connected and secured to the power source (DC-input power supplies only).
- Ensure that the tape (that you applied earlier) is removed from the circuit breaker switch handle, and power is restored by moving the circuit breaker handle to the ON position (DC-input power supplies only).
- The console terminal is turned on.

Caution When the power switch on a Cisco uBR7200 series power supply is turned to the OFF (O) position, the power supply enters a reset cycle for 90 seconds. Wait at least 90 seconds before turning the power switch back to the ON (|) position. If you do not wait the full 90 seconds, the power supply does not restart.

Step 2 At the rear of the router, place the power switch on the power supply in the ON (|) position. Repeat this step if a second power supply is installed in the router. The green OK LED on the power supply turns on.

Step 3 Listen for the fans; you should immediately hear them operating.

Step 4 During the boot process, observe the system's LEDs. The LEDs on most of the port adapters go on and off in an irregular sequence. Some may go on, go out, and go on again for a short time. On the I/O controller, the IO power OK LED goes on immediately.

Step 5 Observe the initialization process. When the system boot is complete (a few seconds), the network processing engine begins to initialize the port adapters, Cisco uBR7200 series cable modem cards, and the I/O controller. During this initialization, the LEDs on each port adapter behave differently (most flash on and off). The enabled LED on each port adapter and Cisco uBR7200 series cable modem card goes on when initialization is completed, and the console screen displays a script and system banner similar to the following:

```
Cisco Internetwork Operating System Software
IOS (tm) 7200 Software (C7200-J-M), 11.3(2)T
Copyright (c) 1986-1998 by cisco Systems, Inc.
Compiled Sun 22-Feb-98 06:00 by smith
```

This completes the procedures for connecting input power and powering up the router. This also completes the procedure for replacing the network processing engine in a Cisco 7200 series router or Cisco uBR7200 series router.

Removing and Replacing an AC-Input or DC-Input Power Supply

The weight of power supplies installed in a Cisco 7200 series router might make it difficult for you to pull the network processing engine from its chassis slot. If this is the case, consider removing installed power supplies from the chassis and then removing the network processing engine. The following sections explain how to remove and replace an AC-input or a DC-input power supply in a Cisco 7200 series router.

Note The network processing engine is installed above the power supplies in a Cisco uBR7200 series router. You do not need to remove the power supplies from a Cisco uBR7200 series router to pull the network processing engine from its chassis slot.

Caution Do not mix AC- and DC-input power supplies in the same router.

Removing a Power Supply from a Cisco 7200 Series Router

The steps for removing an AC-input and DC-input power supply from a Cisco 7200 series router are the same. The two power supplies share the same dimensions and faceplates, except for the AC-input receptacle on the AC-input power supply and the DC-input lead receptacles on the DC-input power supply.

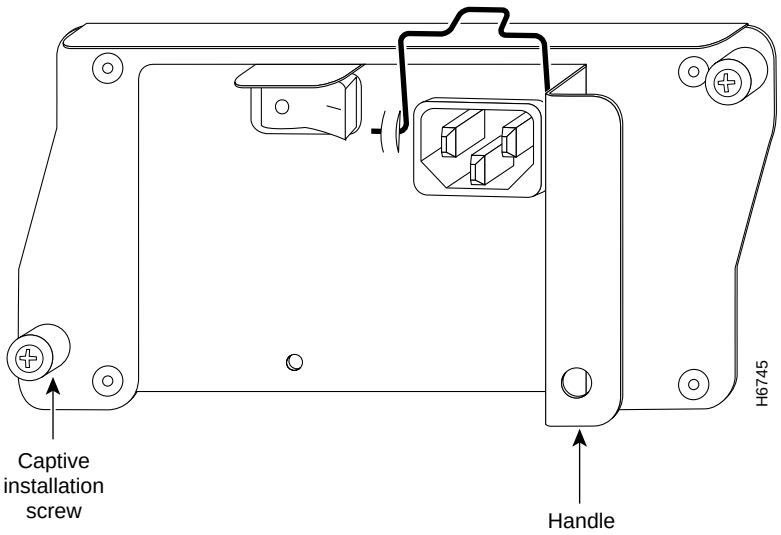
To remove an AC-input or DC-input power supply from a Cisco 7200 series router, complete the following steps:

Step 1 Ensure that the power switch on the power supply is in the OFF (0) position and input power is disconnected from the power supply and its power source. (See the "Powering Down the Router and Disconnecting Input Power" section on page 19.)

Step 2 Using a number 2 Phillips or a 3/16-inch, flat-blade screwdriver, loosen the two captive screws on the faceplate of the power supply. (See Figure 25.)

If the router is not installed in a standard 19-inch, 4-post rack or in a telco rack, skip to Step 6. If the router is installed in a rack, determine if any permanent rack fixtures, such as a power strip, are obstructing access to the power supply. If a rack fixture is obstructing access to the power supply, proceed to Step 3.

Figure 25 Power Supply Captive Installation Screws and Handle—Cisco 7200 Series AC-Input Power Supply Shown



Step 3 Using a 3/16-inch flat-blade screwdriver, loosen the screws that secure the router to the front mounting strips of the rack.

Step 4 Position at least one person in front of the rack to support the front underside of the router.

Step 5 From the rear of the rack, carefully push the front of the router out of the rack until there is enough clearance to remove the power supply.

Step 6 Grasp the power supply handle and pull the power supply from the router.

Caution To maintain agency compliance requirements and meet EMI emissions standards for the Cisco 7200 series chassis with a single power supply, the power supply filler plate must remain in the power supply adjacent to the installed power supply. Do not remove this filler plate from the router unless you intend to install a redundant power supply.

Step 7 Repeat Step 1 through Step 6 for the other installed power supply (if present).

This completes the procedure for removing an AC-input or DC-input power supply from a Cisco 7200 series router.

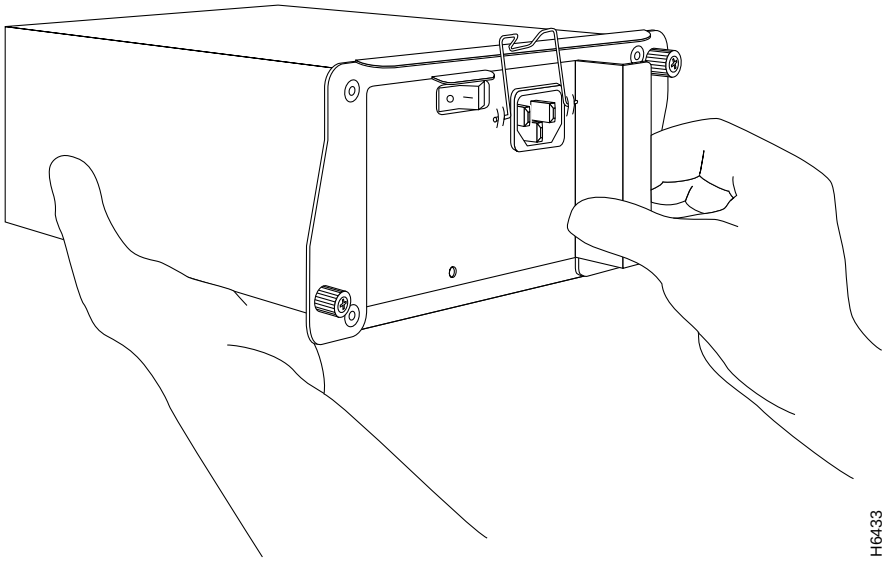
Replacing a Power Supply in a Cisco 7200 Series Router

To install a new AC-input or DC-input power supply in a Cisco 7200 series router, complete the following steps:

Step 1 Make sure that the power switch on the power supply is in the OFF (O) position.

Step 2 Grasp the power supply handle with one hand and place your other hand underneath the power supply for support. (See Figure 26.)

Figure 26 Holding the Power Supply—Cisco 7200 Series AC-Input Power Supply Shown



Step 3 Align the power supply to the power supply bay.

Step 4 Slide the power supply completely into the power supply bay until its faceplate is flush with the router's rear panel.

Caution When inserting a power supply into the router, do not use unnecessary force; slamming the power supply into the bay can damage the connectors on the rear of the supply and on the midplane.

Step 5 Seat the power supply in the router by tightening its captive screws with a number 2 Phillips or a 3/16-inch flat-blade screwdriver.

Note The power supply is not fully seated in the router midplane until you tighten its captive installation screws (use a number 2 Phillips or a 3/16-inch flat-blade screwdriver).

Step 6 Repeat Step 1 through Step 5 for a second power supply (if present).

Step 7 If there is no second power supply, replace the filler plate on the empty power supply bay. Using a number 2 Phillips or a 3/16-inch flat-blade screwdriver, tighten the filler plate's captive screws.

Step 8 If you pushed the router from the rack, slowly guide the router back into the rack.

Step 9 Use a 3/16-inch flat-blade screwdriver to tighten the screws that secure the router to the front mounting strips of the rack.

Caution To maintain agency compliance requirements and meet EMI emissions standards for the Cisco 7200 series routers with a single power supply, the power supply filler plate must remain in the power supply adjacent to the installed power supply. Do not remove this filler plate from the router unless you intend to install a redundant power supply.

This completes the procedures for replacing an AC-input or DC-input power supply in a Cisco 7200 series router.

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